



Developing a low-cost green hydrogen production system



Disclaimer

This Presentation (as defined below) does not constitute or form part of, and should not be construed as, an offer or invitation to sell or any solicitation of any offer to purchase or subscribe for any securities of the Company.

The content of this presentation has not been approved, nor is being made by an authorised person within the meaning of Section 21(2)(b) of the financial services and markets act 2000 ("FSMA"). Reliance on this Presentation for the purpose of engaging in any investment activity may expose an individual to a significant risk of losing all of the property or other assets invested.

The content of this presentation by Hydrogen Future Industries PLC (the "Company") and the documents, comments and information contained within it (together the "Presentation") have been prepared by the Company and has not been approved by an authorised person in accordance with section 21 of FSMA. Accordingly, this Presentation is being made to, or directed only at, persons who are (i) 'investment professionals' as defined in article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (the "Financial Promotion Order"); (ii) persons falling within any of the categories of persons describes an articles 48, 50 or 50A of the Financial Promotion Order and therefore it is exempt from the general restriction in section 21 of FSMA.

For the avoidance of doubt, any person resident outside of the United Kingdom who wishes to view these materials must first satisfy themselves that they are not subject to any local requirements that prohibit or restrict access and must not access the information or apply to invest unless authorised, eligible and lawful to do so.

No public offer in any jurisdiction is being made by the Presentation. The Presentation is primarily intended for release in the United Kingdom and is not directed at persons located in the United States, South Africa, Canada or Japan, does not constitute an offer, or a solicitation of an offer in relation to shares in any jurisdiction in which such an offer is unlawful. The Presentation does not purport to be all-inclusive or necessarily to contain all information that the prospective investor may desire in investigating the Company, and may be subject to updating, withdrawal, revision or amendment. No representation or warranty, express or implied, is or will be given by the Company as to the accuracy or completeness of the Presentation or the information of opinions contained therein.

The forward-looking statements in this Presentation are based on current expectations and are subject to risks and uncertainties that could cause actual results to differ materially, from those expressed or implied by those statements. If one or more of these risks or uncertainties materialises, or if the underlying assumptions prove incorrect, the Company's actual results may vary materially from those expected, estimated or projected. Given these risks and uncertainties, potential investors should not place any reliance on forward-looking statements. These forward-looking statements are made only as at the date of the Presentation.

Each recipient of the Presentation must make their own independent assessment of the information provided by the Company and is recommended to seek independent advice on its contents before making an investment of the kind in question. The Company, and its officers and directors, shall not be liable for any direct, indirect, or consequential loss or damage suffered by any person relying on statements or

omissions from the Presentation, and to the maximum extent permitted by law, all conditions, warranties and other terms which might be implied by statute, common law, or the law of equity, and any such liabilities are expressly excluded. The Presentation should not be construed as a recommendation to prospective investors by the Company to invest in the Company and does not form any commitment by the Company to proceed with an investment. The Company reserves the right to terminate procedure anytime and terminate any discussions and negotiations with any prospective investor at any time without giving any reason.

RISK WARNING: Potential investors should be aware of the risk associated with an investment in the Company and if they have any doubt regarding the contents of the Presentation, must consult their own special advisers. Investment in the Company carries substantial risk and may involve special risks that could lead to a loss of all, or a substantial amount, of such investment. Unless prospective applicants for shares fully understand and accept the nature of the Company and the potential risks inherent in the Company they should not invest in the Company. A prospective investor should consider carefully whether making an investment in the Company is suitable for themselves considering their personal circumstances, the economic climate, and the financial resources available to them. There can be no assurance that the Company's objectives will be achieved. As such, an investor's capital may be a risk.

Hydrogen is critical to combatting climate change

It can provide the lowest-cost decarbonisation solution for 22% of final energy used by 2050, roughly equivalent to the role electricity takes in today's global energy mix

Hydrogen Council



About us

Who we are

HFI is backing technologies which aim to reduce the cost of hydrogen produced from renewable energy and provide hydrogen energy storage at a fraction of the cost of lithium-ion batteries

What we do

Our most advanced system in development is a unique, highly efficient wind turbine, combined with hydraulics and electrolyser technologies, which aims to generate green hydrogen for under \$2/kg

Why we do it

Hydrogen is a clean-burning fuel and an efficient energy carrier with the potential to replace fossil fuels in hard-to-abate sectors. But the economics of green hydrogen remain challenging. **Our business model is focused around reducing the cost of green hydrogen by reducing the cost of the renewable energy used to produce it**

Where we will do it

One commercialisation path is for modular independent hydrogen power systems for off-grid and remote energy supply for use in heavy industry and EV charging. On a larger scale our system could also be used to establish offshore wind-to-hydrogen energy hubs

The Hydrogen Economy

- The urgency to progress hydrogen projects today is greater than ever
- The hydrogen economy is centred around using hydrogen to decarbonise hard-to-abate sectors such as mining, cement, steel, and long-haul transport and developing the associated energy delivery infrastructure
- For the world to be on track for net zero emissions by 2050, investments of some \$700 billion in hydrogen are needed through 2030 – only 3% of this capital is committed today (Hydrogen Council/McKinsey)
- The cost of green hydrogen production currently sits between around \$3.25-\$8.75/kg* and must be reduced to under \$2/kg to meet global targets this decade – we believe our system has the potential to achieve this

The Hydrogen Council estimates by 2050:



Global hydrogen market



Annual CO₂ abatement



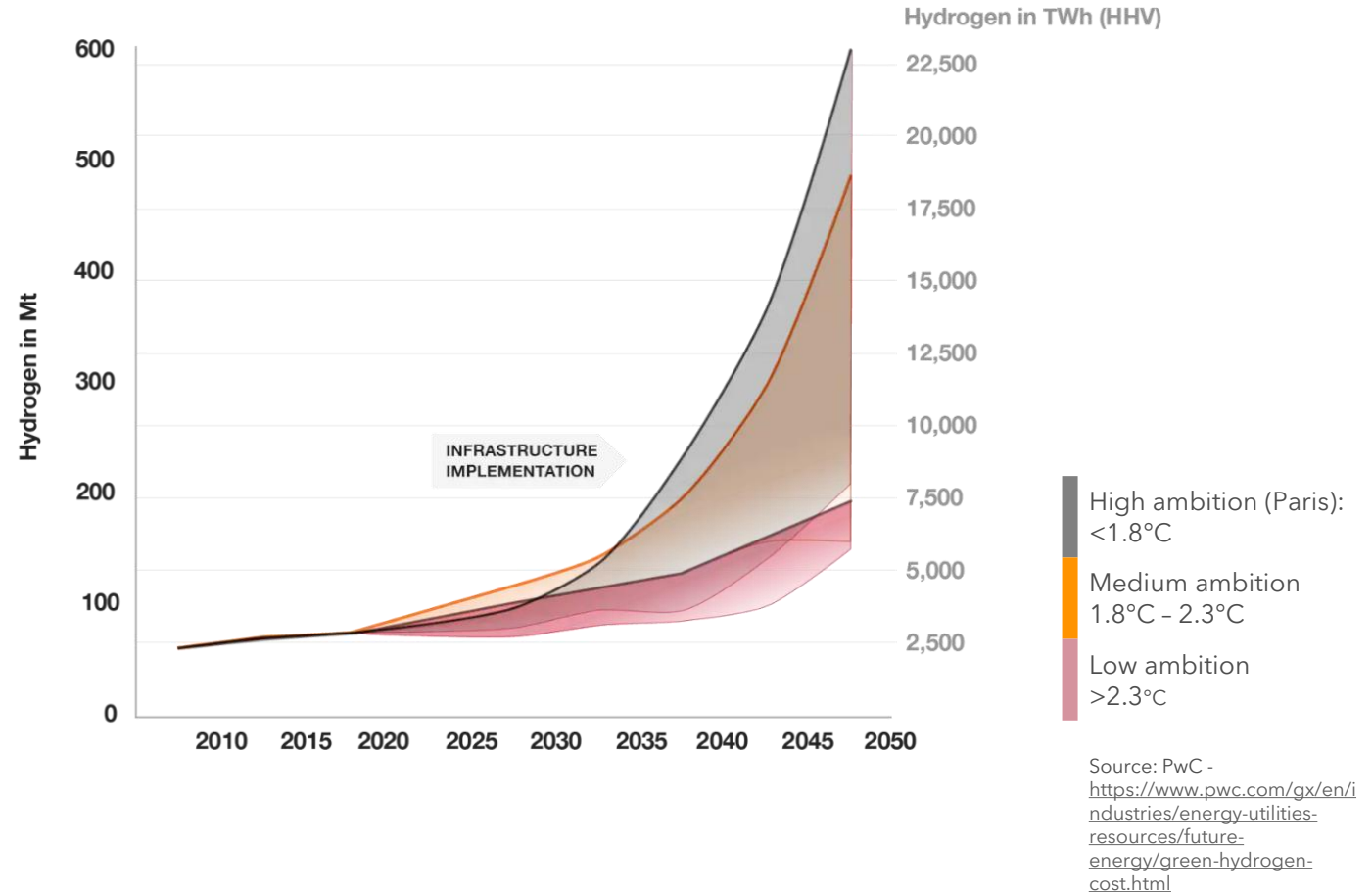
Global energy demand met by hydrogen

*PwC: <https://www.pwc.com/gx/en/industries/energy-utilities-resources/future-energy/green-hydrogen-cost.html>

Hydrogen demand

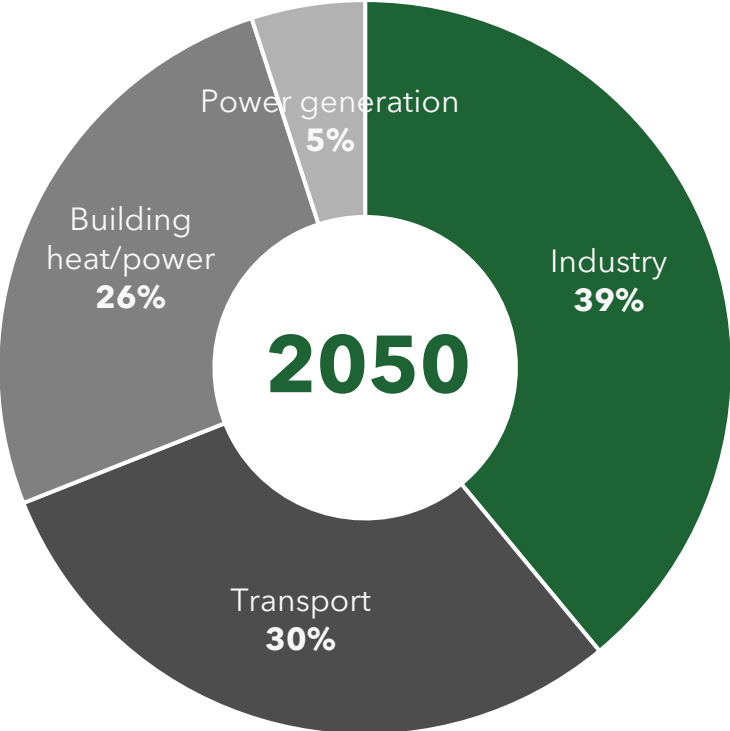
- Based on a range of planet temperature goal scenarios, larger quantities of hydrogen are needed to achieve more ambitious climate targets
- Striving to meet Paris Agreement goals results in a hydrogen demand of 220-600 Mt by 2050, with an average growth to around 350 Mt - world will need up to 6x more hydrogen produced annually
- This presents a significant value creation opportunity for low-cost green hydrogen production

Range of Hydrogen Demand Assessment by 2050

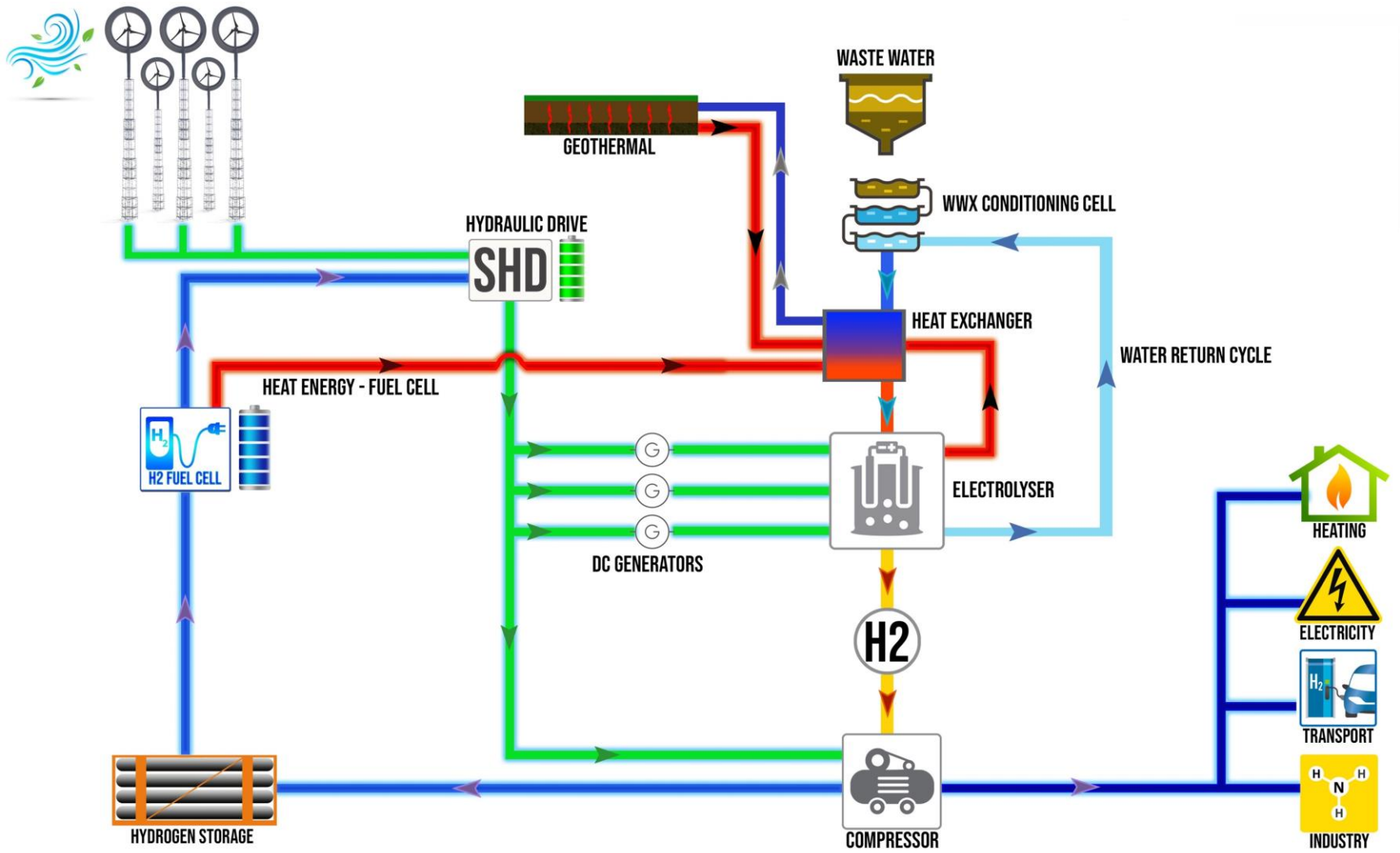


Hydrogen uses

Hydrogen use breakdown in EU
(EU is a good proxy for industrialised countries)



Our system: process diagram



Our system: wind turbine

Advanced aerodynamics and rotor blade design

- Smaller, quieter, safer, more efficient alternative to existing open rotor wind turbines
- Proprietary rotor blade design with optimised cowling directs airflow across blades, creating multiple factor increase in wind speed
- Years of numerical modelling and wind tunnel development have indicated **3x increase in energy generation** over existing open rotor wind turbines due to unique design spreading energy across rotor blades
- No gearbox or generator required: reduces weight and cost of nacelle; simplified installation and maintenance; standardised transportation
- Phase I and II testing with 1 metre diameter prototype completed in Montana, USA; Phase III testing of upgraded turbine to measure energy output and gather data underway
- Initial data supportive of system's capacity to produce low-cost renewable energy and therefore affordable green hydrogen



Upgraded 1 metre prototype turbine undergoes testing in Montana, USA, Q3 2023

Our system: hydrogen production, compression and storage

Storing energy as hydrogen at a fraction of the cost of lithium-ion batteries

- Generates hydrogen from a choice of feed stocks including waste or contaminated water, saline or fresh water, and remediation processes
- The system can be operated in a variety of settings, including offshore, mining, and industrial
- The energy system incorporates hydrogen storage for on-demand energy supply
- Hydrogen compressors are powered by the hydraulic smart drive, improving efficiency and reducing the capital cost of the compression
- Hydrogen storage technology is a fraction of the cost of lithium-ion battery storage, solving the challenges faced by current windfarms during periods of reduced energy demand



Our system: Smart Hydraulic Drive (SHD)

Variable hydraulic drive increases efficiency and lowers energy production cost

- Multiple variable hydraulic pumps in hub of wind turbine - replacing gearbox in a conventional wind turbine and removing generator from the nacelle
- Electrical power generation (if required) is decoupled from wind turbine
- The SHD operates from 3-60 MPH; significantly greater wind speeds than current technology
- Generates energy efficiently over a greater wind speed parameter than existing wind turbines
- Improved reliability and reduced maintenance
- Numerous energy output options - electrical (AC or DC), power take-off, storage, air compression, irrigation, air conditioning
- Hydrogen electrolyzers require a direct DC power supply. Our system removes need for AC to DC rectifiers, saving on capital costs and 20%-40% in electrical requirements
- Development activities from HFI facility in Birmingham, UK



Our system: dynamic tower

Dynamic telescopic tower optimises wind farm energy production

- Wind turbine can be raised and lowered to capture optimal wind speed
- Built-in load sensors automatically lower tower in extreme high winds or seismic activity
- Reduced maintenance costs
- Reduction in installation costs (large cranes not required)
- Wind farm optimization - each wind turbine operates in its "own space"
- Wind turbines can operate at different heights and out of the disturbed airflow
- The tower is controlled by excess hydraulic energy stored from our patented "Smart Drive"



Our system: high-performance electrolyser

Our electrolyser aims to improve power efficiency, longevity and cost; testing at up to **97% efficiency**

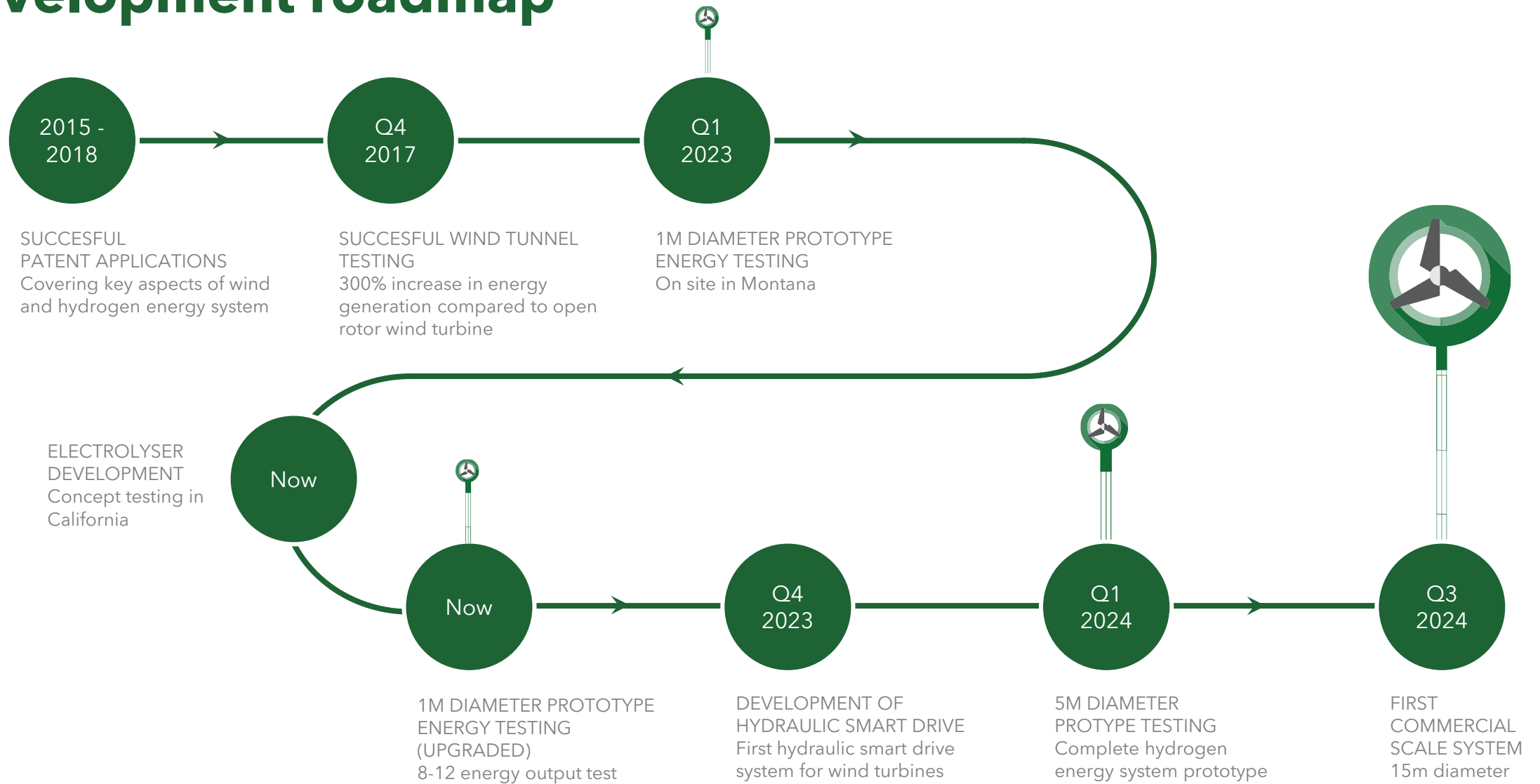
- Developing an Anion Exchange Membrane Water Electrolyser (AEMWE) without platinum group metal catalysts - **cheaper and more readily available materials**
- Features include:
 - 50% cheaper than Proton Exchange Membrane (PEM)
 - Variable Cell technology that optimises the electrolyser to the available energy, works with renewable energy
 - 7-10 year membrane life
 - Zero Gap
 - Carbonised material electrodes
 - No wash-off of catalysts provides exceptional electrode life without output efficiency depletion over time as with PEM
- Completed build of two electrolyser test cells - achieved **exceptional efficiency of up to 97%**
- Concept testing led by quantum-physicist Dr Nicholas Blake in California
- Patent searches and application writing underway



Intellectual property

- Acquisition of suite of patents in 2022 significantly enhances IP
- Patents were granted in respect of work undertaken by Tim Blake between 2015-2018, prior to him joining HFI
- Cover a range of works including:
 - Ducted wind turbine rotor configuration
 - Dynamic telescopic tower to optimise wind farm energy production and reduce maintenance cost
 - 3D yaw control
 - Variable hydraulic drive and electro-magnetic clutch to increase efficiency and lower cost of energy production
 - Conversion of stored energy to green hydrogen
- Patents cover most major markets where HFI plans to develop the hydrogen energy systems
- Potential wider commercial applications for patents exist in renewable energy generation sector beyond HFI's systems

Development roadmap



Our end-markets

- Hydrogen production and storage
- Offshore floating wind turbines - any country with coastline can be energy self-sufficient
- Small onshore wind market
- Mining industry accounts for 10% of global energy consumption and 80% of global electricity consumption. HFI's system can be used to extract hydrogen from wastewater on mine sites to power operations (company has agreement in principle to collaborate with a global mining major)
- Agreement signed with UK developer of hydrogen production and distribution facilities (company 20% owned by HFI) for system to be implemented as preferred green hydrogen production technology



13.6m H2 Tube Trailer



Compressor



Pump



Fuel Cell Electric Vehicle

Market engagement example: mining sector

Based on engagement with a global mining major

Size: >\$30 billion market value

Mine sites: >15 worldwide

Problem

- Energy hungry - mines are typically remote and require huge energy resources to sustain operations accounting for 10% of global energy and 80% of electricity consumption as a sector - and metals mining needs to increase six-fold by 2040 to achieve 2050 climate targets
- Wastewater treatment - mines generate hundreds of gallons of wastewater per minute that requires treatment before release

Solution

- HFI wind hydrogen production system solves both problems:
 - Wastewater is converted to hydrogen and clean water from the energy generated
 - HFI creates enough hydrogen and energy from the wastewater generated by the mining process to power mines



Impact

- Low cost on-demand renewable energy - green hydrogen for under \$2/kg - significantly lower than other green hydrogen production systems ranging from \$3.25-\$8.75/kg and in line with global 2030 target
- Constant electricity at costs up to 50% below current wind turbines, and nearly halving capital costs per megawatt of electricity
- Local energy supply - industrial and commercial markets - achieves EU policy objectives
- Urban applications due to reduced size - smart grids
- Independent energy supply (off-grid power) - can be operated in a variety of settings, including offshore, mining, and industrial



Development team



Tim Blake

CEO HFI Energy Systems

(system development subsidiary)

- Specialised in development of efficient turbine systems for over 12 years - written multiple patents
- Former Toyota, General Motors, MoD, Ford and Airbus
- Tim has worked on the energy system from day one and currently operates out of HFI's R&D centre in Montana
- HFI Advisory Board member



Steve Wills

Control & Fuel Cell Systems

- Hydrogen Fuel Cell, electrolyser and wind energy control systems and optimisation
- Developed the first hydrogen fuel cell taxicab in 2002
- Alternative fuel development for Nissan. Engine development for McLaren, Aston Martin and Cosworth



Tom Newton

Consultant

- Overseen all engineering activities and EPC contract negotiations for development and construction of \$5 billion LNG plant in the US with Venture Global LNG
- VP of AES Corporation and responsible for asset optimisation of 123 fossil and renewable generating plants worldwide



Dr Nicholas Blake

Hydrogen Systems Development

- Ph.D. Quantum Electrodynamics
- Spent five years developing hydrogen fuel cell technology for US Government before technology was sold to Toyota Group
- HFI Advisory Board member



Earl Dodd

Software Development

- Scalable Analytics, Visualisation, HPC and Cyber security
- Currently advises US Government on various HPC and security issues
- Former head of supercomputing for IBM and Fujitsu
- Responsible for security and operations software of the energy system

Appendix



Board and finance



Dan Maling
Executive Director

- Member and Fellow of the Chartered Accountants of Australia & New Zealand
- > 25 years' senior corporate and commercial management experience primarily in natural resources and technology sectors
- Worked with several AIM, ASX and TSX listed companies providing corporate finance, business development and strategic advice
- Previously Corporate Finance and Business Development Manager for AIM listed mining and oil and gas investment house Cambrian Mining which merged with Western Canadian Coal before being bought by Walter Energy for US\$3.3bn



Neil Ritson
Non-Executive Chairman

- Experienced energy sector professional with a career spanning over 40 years, including 20 years in various technical and managerial positions with British Petroleum
- Formerly International Vice President at Burlington Resources, which was acquired by ConocoPhillips, and Executive Chairman at Solo Oil plc (now Scirocco Energy plc)
- Non-Executive Chairman of Helium Ventures plc



Fungai Ndoro
Non-Executive Director

- Experienced corporate financier specialising in growth companies within the London market
- Corporate Finance for over a decade, predominantly with Peterhouse Capital, advising on a broad spectrum of transactions including IPOs, acquisitions and disposals, fundraisings, and structural reorganisations
- Executed the structuring and launch of several companies within resources, technology and life sciences sectors
- Non-Executive Director of Helium Ventures Plc



Ryan Neates
Financial Controller (non-board)

- Member of the Chartered Accountants of Australia & New Zealand
- Experienced in private practice and commercial accounting

Capital structure

Key information

Exchange	Aquis (AQSE) Stock Exchange	Growth Market
Ticker	HFI	
Issued Share Capital	49,500,000	
Warrants in Issue	3,050,000	

Substantial shareholders

Timothy Blake (Director, HFI Energy Systems)	28.28%
David Lenigas	4.24%
Sebastian Marr	4.04%
Sanderson Capital Partners Limited	3.03%
Clive Roberts	3.03%

Directors' shareholdings

Daniel Maling	2.42%
Fungai Ndoro	0.51%
Neil Ritson	0.40%



HYDROGEN
FUTURE INDUSTRIES

Contact

Daniel Maling, Executive Director

dm@hydrogenfutureindustries.com

+44 (0)20 3475 6834

Central Working Victoria, 25 Eccleston Place, London, SW1W 9NF

Follow us on social media



@HydrogenFI



Hydrogen Future Industries